

The Big Book of Concepts. By Gregory L. Murphy. The MIT Press, Cambridge, MA. (2002). 555 pages. \$45.

Contents:

1. Introduction. 2. Typicality and the classical view of categories. 3. Theories. Appendix: The generalized context method. 4. Exemplar effects and theories. 5. Miscellaneous learning topics. 6. Knowledge effects. 7. Taxonomic organization and the basic level of concepts. 8. Induction. 9. Concepts in infancy. 10. Conceptual development. 11. Word meaning. 12. Conceptual combination. 13. Anti-summary and conclusions. Notes. References. Name index. Subject index.

Information and Randomness: An Algorithmic Perspective. Second Edition, Revised and Extended. By Cristian S. Calude. Springer, New York. (2002). 467 pages. \$54.95.

Contents:

Editor's foreword (A. Salomaa). Foreword (G.J. Chaitin). Preface to the second edition (C.S. Calude). Preface to the first edition (C.S. Calude). 1. Mathematical background. 1.1. Prerequisites. 1.2. Computability theory. 1.3. Topology. 1.4. Probability theory. 1.5. Exercises and problems. 2. Noiseless coding. 2.1. Prefix-free sets. 2.2. Instantaneous coding. 2.3. Exercises and problems. 2.4. History of results. 3. Program-size. 3.1. An example. 3.2. Computers and complexities. 3.3. Algorithmic properties of complexities. 3.4. Quantitative estimates. 3.5. Halting probabilities. 3.6. Exercises and problems. 3.7. History of results. 4. Computability enumerable instantaneous codes. 4.1. The Kraft-Chaitin theorem. 4.2. Relativized complexities and probabilities. 4.3. Speed-up theorem. 4.4. Algorithmic coding theorem. 4.5. Binary vs non-binary coding (1). 4.6. Exercises and problems. 4.7. History of results. 5. Random strings. 5.1. An empirical analysis. 5.2. Chaitin's definition of random strings. 5.3. Relating complexities K and H . 5.4. A statistical analysis. 5.5. A computational analysis. 5.6. Borel normality. 5.7. Extensions of random strings. 5.8. Binary vs non-binary coding (2). 5.9. Exercises and problems. 5.10. History of results. 6. Random sequences. 6.1. From random strings to random sequences. 6.2. The definition of random sequences. 6.3. Characterizations of random sequences. 6.4. Properties of random sequences. 6.5. The reducibility theorem. 6.6. The randomness hypothesis. 6.7. Exercises and problems. 6.8. History of results. 7. Computably enumerable random reals. 7.1. Chaitin's omega number. 7.2. Is randomness base invariant? 7.3. Most reals obey no probability laws. 7.4. Computable and uncomputable reals. 7.5. Computably enumerable reals, domination and degrees. 7.6. A characterization of computably enumerable random reals. 7.7. Degree-theoretic properties of computably enumerable random reals. 7.8. Exercises and problems. 7.9. History of results. 8. Randomness and incompleteness phenomenon. 8.2. Information-theoretic incompleteness (1). 8.3. Information-theoretic incompleteness (2). 8.4. Information-theoretic incompleteness (3). 8.5. Coding mathematical knowledge. 8.6. Finitely refutable mathematical problems. 8.7. Computing 64 bits of a computably enumerable random real. 8.8. Turing's barrier revisited. 8.9. History of results. 9. Applications. 9.1. The infinity of primes. 9.2. The undecidability of the halting problem. 9.3. Counting as a source of randomness. 9.4. Randomness and chaos. 9.5. Randomness and chaos. 9.6. Random sequences of reals and Riemann's zeta-function. 9.7. Probabilistic algorithms. 9.8. Structural complexity. 9.9. What is life? 9.10. Randomness in physics. 9.11. Metaphysical themes. 10. Open problems. Bibliography. Notation index. Subject index. Name index.

Algorithms on Trees and Graphs. By Gabriel Valiente. Springer, New York. (2002). 490 pages. \$49.95.

Contents:

Preface. Part I. Introduction. 1. Introduction. 1.1. Trees and graphs. 1.2. Literate programming. 1.3. Implementation correctness. 1.4. Representation of trees and graphs. Summary. Bibliographic notes. Review problems. Exercises. 2. Algorithmic techniques. 2.1. The tree edit distance problem. 2.2. Backtracking. 2.3. Branch-and-bound. 2.4. Divide-and-conquer. 2.5. Dynamic programming. Summary. Bibliographic notes. Review problems. Exercises. Part II. Algorithms on trees. 3. Tree traversal. 3.1. Preorder traversal of a tree. 3.2. Postorder traversal of a tree. 3.3. Top-down traversal of a tree. 3.4. Bottom-up traversal of a tree. 3.5. Applications. Summary. Bibliographic notes. Review problems. Exercises. 4. Tree isomorphism. 4.1. Tree isomorphism. 4.2. Subtree isomorphism. 4.3. Maximum common subtree isomorphism. 4.4. Applications. Summary. Bibliographic notes. Review problems. Exercises. Part III. Algorithms on graphs. 5. Graph traversal. 5.1. Depth-first traversal of a graph. 5.2. Breadth-first traversal of a graph. 5.3. Applications. Summary. Bibliographic notes. Review problems. Exercises. 6. Clique, independent set, and vertex cover. 6.1. Cliques, maximal cliques, and maximum cliques. 6.2. Maximal and maximum independent sets. 6.3. Minimal and minimum vertex covers. 6.4. Applications. Summary. Bibliographic notes. Review problems. Exercises. 7. Graph isomorphism. 7.1. Graph isomorphism. 7.2. Graph automorphism. 7.3. Subgraph isomorphism. 7.4. Maximal common subgraph isomorphism. 7.5. Applications. Summary. Bibliographic notes. Review problems. Exercises. Part IV. Appendices. A. An overview of LEDA. A.1. Introduction. A.2. Data structures. A.3. Fundamental graph algorithms. A.4. A simple representation of trees. A.5. A simple implementation of radix sort. Bibliographic notes. B. Interactive demonstration of graph algorithms. C. Program modules. Bibliography. Index.

Economic Policy Reforms and the Indian Economy. Edited by Anne O. Krueger. The University of Chicago Press, Chicago, IL. (2002). 377 pages. \$75.

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Foreword (G.P. Shultz). Acknowledgments. Abbreviations. Chronology of major political and economic events. Introduction (A.O. Krueger). I. Current state of the economy. 1. The Indian economy in global con-

text (A.O. Krueger and S. Chinoy). 2. India's fiscal situation: Is a crisis ahead? (T.N. Srinivasan). Comment (S. Acharya). Comment (K. Kletzer). Comment (N.K. Singh). 3. State-level performance under economic reforms in India (M.S. Ahluwalia). Comment (S. Acharya). II. Private economic activity. 4. Doing business in India: What has liberalization changed? (N. Forbes). 5. Bangalore: The Silicon Valley of Asia? (A. Saxenian). Comment (N.R. Narayana Murthy and S. Raju). Comment (A. Desai). III. Government activity. 6. Small-scale industry policy in India: A critical evaluation (R. Mohan). Comment (R.G. Noll). 7. Emerging challenges for Indian education policy (A. Kochar). 8. Does economic growth increase the demand for schools? Evidence from rural India, 1960-99 (A.D. Foster and M.R. Rosenzweig). 9. Priorities for further reforms (A.O. Krueger). Conference participants. Contributors. Author index. Subject index.

Combinatorial Algorithms. Enlarged Second Edition. By T. C. Hu and M. T. Shing. Dover Publications, Mineola, NY. (2002). 354 pages. \$16.95.

Contents:

Preface. Preface to the second edition. 1. Shortest paths. 1.1. Graph terminology. 1.2. Shortest path. 1.3. Multiterminal shortest path. 1.4. Decomposition algorithm. 1.5. Acyclic network. 1.6. Shortest paths in a general network. 1.7. Minimum spanning tree. 1.8. Breadth-first-search and depth-first-search. 2. Maximum flows. 2.1. Maximum flow. 2.2. Algorithms for max flows. 2.2.1. Ford and Fulkerson. 2.2.2. Karzanov's algorithms. 2.2.3. MPM algorithms. 2.2.4. Analysis of algorithms. 2.3. Multi-terminal maximum flows. 2.3.1. Realization. 2.3.2. Analysis. 2.3.3. Synthesis. 2.3.4. Multi-commodity flows. 2.4. Minimum cost flows. 2.5. Applications. 2.5.1. Sets of distinct representatives. 2.5.2. PERT. 2.5.3. Optimum communication spanning tree. 3. Dynamic programming. 3.1. Introduction. 3.2. Knapsack problem. 3.3. Two-dimensional knapsack problem. 3.4. Minimum-cost alphabetic tree. 3.5. Summary. 4. Backtracking. 4.1. Introduction. 4.2. Estimating the efficiency of backtracking. 4.3. Branch and bound. 4.4. Game-tree. 5. Binary tree. 5.1. Huffman's tree. 5.3. Alphabetic tree. 5.4. Hu-Tucker algorithm. 5.5. Feasibility and optimality. 5.6. Garsia and Wach's algorithm. 5.7. Regular cost function. 5.8. T-ary tree and other results. 6. Heuristic and near optimum. 6.1. Greedy algorithm. 6.2. Bin-packing. 6.3. Job-scheduling. 6.4. Job-scheduling (tree constraints). 7. Matrix multiplication. 7.1. Strassen's matrix multiplication. 7.2. Optimum order of multiplying matrices. 7.3. Partitioning a convex polygon. 7.4. The heuristic algorithm. 8. NP-complete. 8.1. Introduction. 8.2. Polynomial algorithms. 8.3. Nondeterministic algorithms. 8.4. NP-complete problems. 8.5. Facing a new problem. 9. Local indexing algorithms. 9.1. Mergers of algorithms. 9.2. Maximum flows and minimum cuts. 9.3. Maximum adjacency and minimum separation. 10. Gomory-Hu tree. 10.1. Tree edges and tree links. 10.2. Contraction. 10.3. Domination. 10.4. Equivalent formulations. 10.4.1. Optimum mergers of companies. 10.4.2. Optimum circle partition. 10.5. Extreme stars and host-feasible circles. 10.6. The high-level approach. 10.7. Chop-stick method. 10.8. Relationship between phases. 10.9. The staircase diagram. 10.10. Complexity issues. Appendix A. Comments on Chapters 2, 5, and 6. A.1. Ancestor trees. A.2. Minimum surface or plateau problem. A.3. Comments on binary trees on Chapter 5. A.3.1. A simple proof of the Hu-Tucker algorithm. A.3.2. Binary search trees. A.3.3. Binary search on a tape. A.4. Comments on §6.2, bin-packing. Appendix B. Network algebra.

Cellular Automata and Complexity: Collected Papers. By Stephen Wolfram. Westview Press, Boulder, CO. (1994). 596 pages. \$35.

Contents:

Part One. Primary papers. Statistical mechanics of cellular automata. Algebraic properties of cellular automata. Universality and complexity in cellular automata. Computation theory of cellular automata. Undecidability and intractability in theoretical physics. Two-dimensional cellular automata. Origins of randomness in physical systems. Thermodynamics and hydrodynamics of cellular automata. Random sequence generation by cellular automata. Approaches to complexity engineering. Minimal cellular automation approximations to continuum systems. Cellular automaton fluids: Basic theory. Part Two. Additional and survey papers. Cellular automata. Computers in science and mathematics. Geometry of binomial coefficients. Twenty problems in the theory of cellular automata. Cryptography with cellular automata. Complex systems theory. Cellular automaton supercomputing. Part Three. Appendices. Tables of cellular automaton properties. Scientific bibliography of Stephen Wolfram. Index.

The Neural Simulation Language: A System for Brain Modeling. By Alfredo Weitzenfeld, Michael A. Arbib, and Amanda Alexander. The MIT Press, Cambridge, MA. (2002). 439 pages. \$55, £37.95.

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Preface. Acknowledgments. 1. Introduction. 1.1. Neural networks. Modeling. Simulation. 1.2. Modularity, object-oriented programming, and concurrency. Modularity in neural networks. Object-oriented programming. Concurrency in neural networks. 1.3. Modeling and simulation in NSL. Modeling. Modules. Neural networks. Simulation. 1.4. The NSL system. Simulation system. Schematic capture system. Model/module libraries. Basic hierarchy. 1.5. Summary. 2. Simulation in NSL. 2.1. Selecting a model. 2.2. Simulation interface. 2.3. Simulating a model. 2.4. Maximum selector. Model description. Simulation interaction. 2.5. Hopfield. Model description. Simulation interaction. 2.6. Backpropagation. Model description. Simulation interaction. 2.7. Summary. 3. Modeling in NSL. 3.1. Implementing model architectures with NSLM. Modules and models. Neural networks. 3.2. Visualizing model architectures with SCS. 3.3. Maximum selector. Model implementation. 3.4. Hopfield. Model implemen-